Understanding Networks

PHYSIOTHERAPY ASSOCIATION OF BRITISH COLUMBIA

Data Transmission, Infrastructure of the Internet Service Provider, and Networks

Internet delivery has improved substantially over the past several years and even basic high-speed internet services in urban areas are usually more than adequate for videoconferencing sessions. However, if you have a slower connection or live in an urban area, you may need a deeper understanding of internet networks in order to set up Virtual Care.

There are two main considerations here. These are (1) the quality / speed of service being delivered by the Internet Service Provider, and (2) the quality / speed of network being delivered to the clinician within the location they are working in.

Internet Service Provider Infrastructure

There are various types of infrastructure that can connect to a facility or practitioner to transfer data and thus internet connectivity. Each has its own implications on sufficiency of the data speed for telehealth videoconferencing. It is good to know what type of types of infrastructure exists in your region and your potential service region so that you so that you have realistic expectations of your telerehabilitation capabilities. These types of infrastructure, in order of speed, are:

Fiberoptic Internet (50 Mbps to 2000 Mbps):
Fiber is the newest form of wired digital data transmission and provides the fastest speeds through fiberoptic cables. Upload and download speeds are matched making this an the most reliable telehealth medium. However, it is rarer and typically more expensive than cable and DSL and the capabilities are beyond what is necessary for telerehabilitation.

Credit: www.highspeedinternet.com
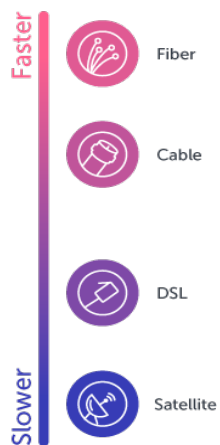
Cable Internet (25 to 300 Mbps):
Cable is run on the familiar co-axial cable that typically plugs into PVRs. The same cable is used to deliver for both TV and internet signals. Cable requires a conversion of digital to analog signals, and thus speeds are less than fiber. However, the delivery mechanism is common in current infrastructure and it tends to be less expensive than fiber. Cable makes a very satisfactory connection for telehealth sessions.

DSL Internet (0.5 Mbps to 75 Mbps):
DSL travels on standard phone lines (at a different frequency than dial-up signals). It, too, requires an analog to digital conversion but it is slower yet than cable. Despite this, telerehabilitation can still be accomplished through most DSL connections.

Satellite Internet (5 Mbps to 25 Mbps):
Satellite internet's greatest attribute is its ability to be available anywhere without the need for massive regional infrastructure. It does, however, have drawbacks compared to the other types of signal transmission. The maximum potential speed is slower, higher data caps tend to be expensive, and the installation of a dish is required. Despite these drawbacks, satellite is still a potential solution for telerehabilitation in regions where fiber, cable, and DSL are not available. However, clinicians and patients will have to be more aware of demands being placed on the system.

Cellular Internet:
Cellular internet deliver is unique in that its transmission is direct to the consumer. While all of the above methods are typically distributed to a home or facility 'router' for further distribution to other devices within, cellular data is delivered directly to the consumer device from transmission and repeater towers. It is the most convenient form of internet delivery in the regions it serves and is very fast. However, it is also the most expensive and is typically prohibitively so for telerehabilitation use for the average consumer.
For more detailed information on high speed internet connections, see this link from www.highspeedinternet.com.

Local Area Networks (Internet connections within the home or facility)

Once an internet connection is made to the home or facility, the information flowing in needs to be distributed to various connection points within that home or facility (the "local area"). This distribution is typically accomplished through a wired ethernet connection or a wireless "Wi-Fi" connection.

Wired (Ethernet) Networks:
A wired network, or LAN (local-area network), connects device(s) to an internet hub or router using an Ethernet cable (typically via a wall outlet). This type of connection offers very little mobility as its signal only broadcasts to the device it is connected to. It is, however, extremely reliable with faster speeds and fewer network interferences that the other methods of connection.

Wireless (Wi-Fi) Networks:
A Wi-Fi network, or WLAN (wireless local-area network) requires a wireless router to be set up to service a specific location. The router broadcasts a signal to a small area, such as a home or office. Any devices(s) in the signal range can connect to this network, providing more mobility than a wired connection. The connection may, however, be subject to signal interference depending on the surrounding environment